

Chlorine Dioxide

Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations
Date of Issue: 05/24/2018

Version: 1.0

SECTION 1: IDENTIFICATION

1.1. Product Identifier

Product Form: Mixture

Product Name: Chlorine Dioxide

1.2. Intended Use of the Product

Use of the Substance/Mixture: Wood Pulp Bleaching Agent

1.3. Name, Address, and Telephone of the Responsible Party

Company

Nanaimo Forest Products Ltd.

Harmac Pulp Operations

1000 Wave Place

Nanaimo, B.C.

Canada

V9X 1J2

Telephone: 250 722 3211

1.4. Emergency Telephone Number

Emergency Number : 250 722 3211

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the Substance or Mixture

GHS-US Classification

Ox. Liq. 1 H271

Acute Tox. 3 (Oral) H301

Acute Tox. 4 H332

(Inhalation:gas)

Skin Corr. 1B H314

Eye Dam. 1 H318

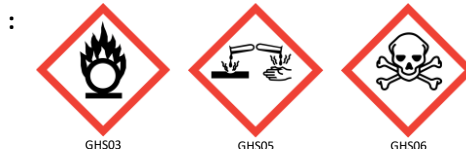
Aquatic Acute 2 H401

Full text of hazard classes and H-statements : see section 16

2.2. Label Elements

GHS-US Labeling

Hazard Pictograms (GHS-US)



Signal Word (GHS-US)

: Danger

Hazard Statements (GHS-US)

: H271 - May cause fire or explosion; strong oxidizer.

H301 - Toxic if swallowed.

H314 - Causes severe skin burns and eye damage.

H318 - Causes serious eye damage.

H332 - Harmful if inhaled.

H401 - Toxic to aquatic life.

Precautionary Statements (GHS-US)

: P210 - Keep away from extremely high or low temperatures, ignition sources, and incompatible materials. - No smoking.

P220 - Keep/Store away from combustible material, oxidizable materials, and incompatible materials.

P221 - Take any precaution to avoid mixing with combustible material, oxidizable materials, and incompatible materials.

P260 - Do not breathe vapors, mist, or spray.

P264 - Wash hands, forearms, and other exposed areas thoroughly after handling.

P270 - Do not eat, drink or smoke when using this product.

P271 - Use only outdoors or in a well-ventilated area.

P273 - Avoid release to the environment.

P280 - Wear protective gloves, protective clothing, and eye protection.

P283 - Wear fire/flammable resistant/retardant clothing.

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P301+P310 - If swallowed: Immediately call a poison center or doctor.
P301+P330+P331 - If swallowed: rinse mouth. Do NOT induce vomiting.
P303+P361+P353 - If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+P340 - If inhaled: Remove person to fresh air and keep at rest in a position comfortable for breathing.
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P306+P360 - If on clothing: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes.
P310 - Immediately call a poison center or doctor.
P321 - Specific treatment (see section 4 on this SDS).
P330 - Rinse mouth.
P363 - Wash contaminated clothing before reuse.
P370+P378 - In case of fire: Use appropriate media (see section 5) to extinguish.
P371+P380+P375 - In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.
P405 - Store locked up.
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations.

2.3. Other Hazards

Exposure may aggravate pre-existing eye, skin, or respiratory conditions.

2.4. Unknown Acute Toxicity (GHS-US)

No data available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substance

Not applicable

3.2. Mixture

Name	Product Identifier	%	GHS-US classification
Water	(CAS-No.) 7732-18-5	98 - 99	Not classified
Chlorine dioxide	(CAS-No.) 10049-04-4	1 - 1.2	Ox. Gas 1, H270 Press. Gas (Comp.), H280 Acute Tox. 1 (Inhalation:gas), H330 Skin Corr. 1B, H314 Eye Dam. 1, H318 STOT SE 3, H335 Aquatic Acute 1, H400

Full text of H-phrases: see section 16

SECTION 4: FIRST AID MEASURES

4.1. Description of First-aid Measures

First-aid Measures General: Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).

First-aid Measures After Inhalation: First, take proper precautions to ensure your own safety before attempting rescue (e.g. wear appropriate respiratory protective equipment, use the buddy system), then remove the exposed person to fresh air. Keep at rest in a position comfortable for breathing. Immediately call a poison center or doctor/physician.

First-aid Measures After Skin Contact: Immediately remove contaminated clothing. Immediately flush skin with plenty of water for at least 30 minutes. Get immediate medical advice/attention.

First-aid Measures After Eye Contact: Immediately rinse with water for at least 30 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.

First-aid Measures After Ingestion: Do NOT induce vomiting. Rinse mouth. Immediately call a POISON CENTER or doctor. Obtain emergency medical attention.

4.2. Most Important Symptoms and Effects Both Acute and Delayed

Symptoms/Injuries: Toxic if swallowed. Causes severe skin burns and eye damage. Toxic if inhaled.

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Symptoms/Injuries After Inhalation: May be corrosive to the respiratory tract. Inhalation of this material can cause serious health effects in small amounts, leading to unconsciousness and death. May cause pulmonary edema.

Symptoms/Injuries After Skin Contact: Causes severe irritation which will progress to chemical burns.

Symptoms/Injuries After Eye Contact: Causes permanent damage to the cornea, iris, or conjunctiva.

Symptoms/Injuries After Ingestion: This material is toxic in small amounts orally, and can cause adverse health effects or death. May cause burns or irritation of the linings of the mouth, throat, and gastrointestinal tract.

Chronic Symptoms: No data available

4.3. Indication of Any Immediate Medical Attention and Special Treatment Needed

If exposed or concerned, get medical advice and attention. If medical advice is needed, have product container or label at hand.

SECTION 5: FIRE-FIGHTING MEASURES

5.1. Extinguishing Media

Suitable Extinguishing Media: Water spray, fog, carbon dioxide (CO₂), alcohol-resistant foam, or dry chemical.

Unsuitable Extinguishing Media: Do not use a heavy water stream. Use of heavy stream of water may spread fire. Ammonia or Nitrogen containing fire extinguishing agents.

5.2. Special Hazards Arising From the Substance or Mixture

Fire Hazard: May cause fire or explosion; strong oxidizer.

Explosion Hazard: Heating may cause an explosion. If product is heated or put under pressure additional chlorine dioxide gas may be formed which could readily decompose and potentially detonate. Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries.

Reactivity: Oxidizer: increases the burning rate of combustible materials. Chlorine dioxide gas is fatal when inhaled. This gas may explode violently at concentrations greater than 10% by volume in air. Do not subject to shock or mechanical impact. Do not allow gas to accumulate in low-lying areas. May react exothermically with water releasing heat. Adding an acid to a base or base to an acid may cause a violent reaction.

5.3. Advice for Firefighters

Precautionary Measures Fire: Exercise caution when fighting any chemical fire.

Firefighting Instructions: Use water spray or fog for cooling exposed containers. In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.

Protection During Firefighting: Do not enter fire area without proper protective equipment, including respiratory protection.

Hazardous Combustion Products: Chlorine gas.

Other Information: Do not allow run-off from fire fighting to enter drains or water courses.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal Precautions, Protective Equipment and Emergency Procedures

General Measures: Do not breathe vapor, mist or spray. Do not get in eyes, on skin, or on clothing. Keep away from heat, hot surfaces, sparks, open flames, and other ignition sources. No smoking. Keep away from combustible material.

6.1.1. For Non-Emergency Personnel

Protective Equipment: Use appropriate personal protective equipment (PPE).

Emergency Procedures: Evacuate unnecessary personnel.

6.1.2. For Emergency Personnel

Protective Equipment: Equip cleanup crew with proper protection.

Emergency Procedures: Upon arrival at the scene, a first responder is expected to recognize the presence of dangerous goods, protect oneself and the public, secure the area, and call for the assistance of trained personnel as soon as conditions permit. Ventilate area.

6.2. Environmental Precautions

Prevent entry to sewers and public waters. Avoid release to the environment.

6.3. Methods and Materials for Containment and Cleaning Up

For Containment: Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams. Use only non-sparking tools. As an immediate precautionary measure, isolate spill or leak area in all directions. Ventilate area.

Methods for Cleaning Up: Clean up spills immediately and dispose of waste safely. Transfer spilled material to a suitable container for disposal. Contact competent authorities after a spill. Absorb and/or contain spill with inert material, then place in suitable container. Do not take up in combustible material such as: saw dust or cellulosic material. Cautiously neutralize spilled liquid.

6.4. Reference to Other Sections

See Section 8 for exposure controls and personal protection and Section 13 for disposal considerations.

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SECTION 7: HANDLING AND STORAGE

7.1. Precautions for Safe Handling

Additional Hazards When Processed: Contains an oxidizing material which may accelerate fire. May release corrosive vapors. If product is heated or put under pressure additional chlorine dioxide gas may be formed which could readily decompose and potentially detonate.

Precautions for Safe Handling: Do not get in eyes, on skin, or on clothing. Do not breathe vapors, gas, mist, or spray. Keep away from extremely high or low temperatures, ignition sources, and incompatible materials. - No smoking. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Handle empty containers with care because they may still present a hazard. Use only outdoors or in a well-ventilated area.

Hygiene Measures: Handle in accordance with good industrial hygiene and safety procedures.

7.2. Conditions for Safe Storage, Including Any Incompatibilities

Technical Measures: Comply with applicable regulations. Proper grounding procedures to avoid static electricity should be followed.

Storage Conditions: Keep container closed when not in use. Store in a dry, cool place. Keep/Store away from direct sunlight, extremely high or low temperatures and incompatible materials. Keep in fireproof place. Store locked up/in a secure area. Store in original container or corrosive resistant and/or lined container.

Incompatible Materials: Combustible materials. Organic materials. Strong acids, strong bases, strong oxidizers. Powdered metals. Ammonium salts. Metals. May be corrosive to metals. Organic peroxides. Chlorates.

7.3. Specific End Use(s)

Wood Pulp Bleaching Agent

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control Parameters

For substances listed in section 3 that are not listed here, there are no established exposure limits from the manufacturer, supplier, importer, or the appropriate advisory agency including: ACGIH (TLV), AIHA (WEEL), NIOSH (REL), or OSHA (PEL).

Chlorine dioxide (10049-04-4)		
USA ACGIH	ACGIH TWA (ppm)	0.1 ppm
USA ACGIH	ACGIH STEL (ppm)	0.3 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m ³)	0.3 mg/m ³
USA NIOSH	NIOSH REL (TWA) (ppm)	0.1 ppm
USA NIOSH	NIOSH REL (STEL) (mg/m ³)	0.9 mg/m ³
USA NIOSH	NIOSH REL (STEL) (ppm)	0.3 ppm
USA IDLH	US IDLH (ppm)	5 ppm
USA OSHA	OSHA PEL (TWA) (mg/m ³)	0.3 mg/m ³
USA OSHA	OSHA PEL (TWA) (ppm)	0.1 ppm

8.2. Exposure Controls

Appropriate Engineering Controls

: Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Gas detectors should be used when toxic gases may be released. Gas detectors should be used when flammable gases or vapors may be released. Proper grounding procedures to avoid static electricity should be followed. Ensure adequate ventilation, especially in confined areas. Ensure all national/local regulations are observed.

Personal Protective Equipment

: Gloves. Protective clothing. Protective goggles. Face shield. Insufficient ventilation: wear respiratory protection.



Materials for Protective Clothing

: Chemically resistant materials and fabrics. Wear fire/flame resistant/retardant clothing. Corrosion-proof clothing.

Hand Protection

: Wear protective gloves.

Eye and Face Protection

: Chemical safety goggles and face shield.

Skin and Body Protection

: Wear suitable protective clothing.

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- Respiratory Protection** : If exposure limits are exceeded or irritation is experienced, approved respiratory protection should be worn. In case of inadequate ventilation, oxygen deficient atmosphere, or where exposure levels are not known wear approved respiratory protection.
- Other Information** : When using, do not eat, drink or smoke.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on Basic Physical and Chemical Properties

- Physical State** : Liquid
- Appearance** : Yellow/green to orange in colour
- Odor** : Unpleasant odour similar to that of chlorine or very strong bleach
- Odor Threshold** : 0.1 ppm
- pH** : No data available
- Evaporation Rate** : Chlorine dioxide gas may evolve from solution
- Melting Point** : No data available
- Freezing Point** : -59 °C (-74.2 °F)
- Boiling Point** : 11 °C (51.8 °F)
- Flash Point** : No data available
- Auto-ignition Temperature** : No data available
- Decomposition Temperature** : No data available
- Flammability (solid, gas)** : Not applicable
- Vapor Pressure** : 1 atm
- Relative Vapor Density at 20°C** : 2.4
- Relative Density** : No data available
- Specific Gravity** : 1.642
- Solubility** : No data available
- Partition Coefficient: N-Octanol/Water** : No data available
- Viscosity** : No data available
- Explosive Properties** : May cause fire or explosion; strong oxidizer.
- Oxidizing Properties** : May cause fire or explosion; strong oxidizer.

9.2. Other Information No additional information available

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity: Oxidizer: increases the burning rate of combustible materials. Solution may evolve dangerous chlorine oxide gas. Chlorine oxide gas is fatal when inhaled. This gas may explode violently at concentrations greater than 10% by volume in air at pressures above 10.1 kPa (76 mmHg). Do not subject to shock or mechanical impact. Do not allow gas to accumulate in low-lying areas. May react exothermically with water releasing heat. Adding an acid to a base or base to an acid may cause a violent reaction.

10.2. Chemical Stability: May intensify fire; oxidizer. Chlorine dioxide is unstable. At partial pressures above about 120 mm Hg, it will decompose spontaneously and explode. At higher pressures the explosions become more violent; at approximately 190 mm Hg explosion relief may be inadequate and rupture of the vessel may occur.

10.3. Possibility of Hazardous Reactions: Hazardous polymerization will not occur.

10.4. Conditions to Avoid: Light. Keep away from heat. Ignition sources. Avoid high temperatures. combustible materials. Incompatible materials.

10.5. Incompatible Materials: Combustible materials. Organic materials. Strong acids, strong bases, strong oxidizers. Powdered metals. Ammonium salts. Metals. May be corrosive to metals. Organic peroxides. Chlorates.

10.6. Hazardous Decomposition Products: Chlorine gas. Thermal decomposition generates : Corrosive vapors.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on Toxicological Effects

Acute Toxicity: Oral: Toxic if swallowed. Inhalation:gas: Harmful if inhaled.

Chlorine Dioxide	
ATE (Oral)	100.00 mg/kg body weight
ATE (Gases)	2,666.67 ppmV/4h
Chlorine dioxide (10049-04-4)	
LD50 Oral Rat	93.86 mg/kg (0.2% gas in water)

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LC50 Inhalation Rat	32 ppm/4h
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Skin Corrosion/Irritation: Causes severe skin burns and eye damage.

Serious Eye Damage/Irritation: Causes serious eye damage.

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Carcinogenicity: Not classified

Reproductive Toxicity: Not classified

Specific Target Organ Toxicity (Single Exposure): Not classified

Specific Target Organ Toxicity (Repeated Exposure): Not classified

Aspiration Hazard: Not classified

Symptoms/Injuries After Inhalation: May be corrosive to the respiratory tract. Inhalation of this material can cause serious health effects in small amounts, leading to unconsciousness and death. May cause pulmonary edema.

Symptoms/Injuries After Skin Contact: Causes severe irritation which will progress to chemical burns.

Symptoms/Injuries After Eye Contact: Causes permanent damage to the cornea, iris, or conjunctiva.

Symptoms/Injuries After Ingestion: This material is toxic in small amounts orally, and can cause adverse health effects or death. May cause burns or irritation of the linings of the mouth, throat, and gastrointestinal tract.

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Ecology - General : Toxic to aquatic life.

Chlorine dioxide (10049-04-4)	
LC50 Fish 1	0.021 Species: Brachydanio rerio (new name: Danio rerio)
NOEC Chronic Algae	0.02 mg/l

12.2. Persistence and Degradability

Chlorine Dioxide	
Persistence and Degradability	Not established.

12.3. Bioaccumulative Potential

Chlorine Dioxide	
Bioaccumulative Potential	Not established.

12.4. Mobility in Soil No additional information available

12.5. Other Adverse Effects

Other Information : Avoid release to the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste Treatment Methods

Waste Disposal Recommendations: Dispose of contents/container in accordance with local, regional, national, territorial, provincial, and international regulations.

Ecology - Waste Materials: Avoid release to the environment. This material is hazardous to the aquatic environment. Keep out of sewers and waterways.

SECTION 14: TRANSPORT INFORMATION

The shipping description(s) stated herein were prepared in accordance with certain assumptions at the time the SDS was authored, and can vary based on a number of variables that may or may not have been known at the time the SDS was issued.

14.1. In Accordance with DOT

Classification of material to be determined at time of transport in accordance with applicable regulations

14.2. In Accordance with IMDG

Classification of material to be determined at time of transport in accordance with applicable regulations

14.3. In Accordance with IATA

Classification of material to be determined at time of transport in accordance with applicable regulations

SECTION 15: REGULATORY INFORMATION

15.1. US Federal Regulations

Chlorine Dioxide	
SARA Section 311/312 Hazard Classes	Physical hazard - Oxidizer (liquid, solid or gas) Health hazard - Acute toxicity (any route of exposure) Health hazard - Serious eye damage or eye irritation Health hazard - Skin corrosion or Irritation

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Water (7732-18-5)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Chlorine dioxide (10049-04-4)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Subject to reporting requirements of United States SARA Section 313	
SARA Section 313 - Emission Reporting	1 %

15.2. US State Regulations

Chlorine dioxide (10049-04-4)
U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
U.S. - Pennsylvania - RTK (Right to Know) List

SECTION 16: OTHER INFORMATION, INCLUDING DATE OF PREPARATION OR LAST REVISION

Date of Preparation or Latest Revision	: 05/24/2018
Other Information	: This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200

GHS Full Text Phrases:

Acute Tox. 1 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 1
Acute Tox. 3 (Oral)	Acute toxicity (oral) Category 3
Acute Tox. 4 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 4
Aquatic Acute 1	Hazardous to the aquatic environment - Acute Hazard Category 1
Aquatic Acute 2	Hazardous to the aquatic environment - Acute Hazard Category 2
Eye Dam. 1	Serious eye damage/eye irritation Category 1
Ox. Gas 1	Oxidizing gases Category 1
Ox. Liq. 1	Oxidizing liquids Category 1
Press. Gas (Comp.)	Gases under pressure Compressed gas
Skin Corr. 1B	Skin corrosion/irritation Category 1B
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
H270	May cause or intensify fire; oxidizer
H271	May cause fire or explosion; strong oxidizer
H280	Contains gas under pressure; may explode if heated
H301	Toxic if swallowed
H314	Causes severe skin burns and eye damage
H318	Causes serious eye damage
H330	Fatal if inhaled
H332	Harmful if inhaled
H335	May cause respiratory irritation
H400	Very toxic to aquatic life
H401	Toxic to aquatic life

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

SDS US (GHS HazCom)